MINIATURE AIR MONITORING SYSTEMS

NEW MINIATURES SERIES
CAIRCLIP for H_2S & Mercaptans
Instructions for use

I GENERAL DESCRIPTION

Diameter: 32mm, length: 62mm
Weight: approximately 55g
Operating time: 24 to 36 Hours when fully charged (allow for a recharge each day for optimum use)
Expectancy life: 12 months
Included accessories:
Three filters, two USB plugs, one USB cable, one 100/240V AC adapter, a pouch.
The PC interface software (CairSoft) is available for download at www.cairpol.com

II TECHNICAL DESCRIPTION

The Cairclip is a device intended for the general public that measures chronic low-level exposure of H_2S and Mercaptans. It continuously measures the H_2S and Mercaptans concentration and compares it to different Health Organization Air quality guide line.

H_2S (hydrogen sulfide) is generated mostly wastewater treatment plant off-gases, by-product of desulfurization processes in the oil and gas industries and rayon production, sewage treatment, and leather tanning. Some materials like drywall can generate H_2S too.

These pollutants are capable of causing respiratory and eyes irritations.
By knowing the level of a given pollutant in real time, you will be able to limit their adverse effects by adjusting your activity level (avoid running, quiet activities ...). In addition, carrying such a device can help you tailor your trips to your personal needs by avoiding polluted areas.

The Cairclip is the result of researches from several laboratories and the implementation of the following innovative technologies

* An electrochemical sensor ultra sensitive to H_2S and Mercaptans.
* A dynamic air sampling system (micro-fan) that ensures a constant and smooth airflow to the

CAIRPOL
SARL au capital de 354 200€ - N° Siren : 492 976 253
Avenue Olivier de Serres - Centre Commercial Rocade Sud
30100 Alès – France
Tél : +33 (0)4 66 83 37 56
info@cairpol.com / www.cairpol.com

sensor.
* A patented adaptive filter that permits the same level of performance both indoors and outdoors. This filter should be replaced after 6 months of use or in case of an accidental blockage (mud, food)
* A powerful microprocessor that calculates the levels and time of exposure to pollution, which can be connected via a USB port to a PC to adjust the devices basic settings (name, time, display style, units of measure ...) and to display up to ten months of saved data.

III OPERATION DESCRIPTION

The Cairclip requires no adjustments.

When you receive your Cairclip it will be ready to go on your belt or on the strap of your favorite bag as soon as you remove the red USB cap (keep the red cap in a safe place as it can be used to access various menus in the absence of a PC).
The Green USB plug can be used to protect the USB port if necessary.

When the battery symbol lights up, the device must be charged via USB on your computer or by using the power adapter.

The 4 levels of battery charges on the display will remain lit when fully charged (about 4 hours).

The Cairclip will display the time unless the first level of information of 30 ppb is reached.
Upon reaching this threshold, the display will remain in **Air quality measurement mode**.
To change the original screen to an **Air quality measurement mode**, simply insert the Red USB plug in the Device USB port for 5 seconds and remove it.

To return the screen to the **time display mode**, repeat the previous operation.

IV FILTER REPLACEMENT DESCRIPTION

The only required maintenance to ensure reliable measures by the Cairclip is to replace the adaptive filter after 6 months. Simply remove the old filter by pulling it by its edge and place a new filter in the opening, ensuring that no fibers from the filter hinder the operation of the fan. The filter replacement operation must be made without touching the white part and in an area free of dust or water to avoid damaging your Cairclip.
Replacing the filter must be performed at least 12 hours before next use as the filter requires up to 12 hours settling. If the filter is not allowed to settle, it may damage the integrity of the air quality readings.

Because of the small size of some components (filter, removable USB cap...), the CairClip is not suitable for children under 36 months.

V LOADING CAIRCLIP

If you forget to reload your device more than 7 days, the data will be lost.

VI MEASUREMENT AND ALERTS LEVELS

In the original **time display mode**, the level of pollution measured appears on the screen only when a specific threshold is reached. In the **Air quality measurement mode**, the concentration of H_2S and Mercaptans is given continuously by the 3 digits to the left of the separator (2 points), the time of exposure is indicated by 2 digits to the right as multiple of 10 minutes.

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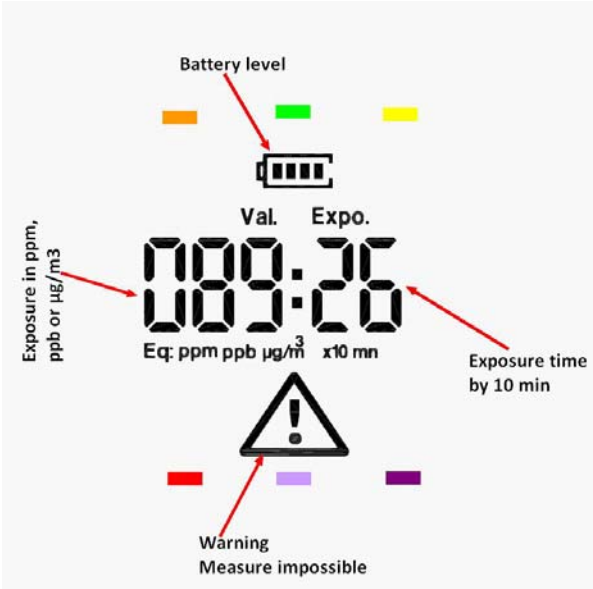
info@cairpol.com / www.cairpol.com



How does the Cairclip display a peak of H_2S and Mercaptans pollution?

Below the first threshold of information, only the green light flashes.

1st level of information threshold, equivalent to 30 ppb of H_2S & Mercaptans: yellow light flashes

Current California Ambient Air Quality standard for hydrogen sulfide, based on a 1 hour averaging time and U.S. Department of Health and Human Services Agency for Toxic Substances and Disease Registry recommended level for 15 to 365 days of exposure (24 hours a day, 7 days a week).

2nd information threshold, equivalent to 70 ppb : orange light flashing

This concern was believed to be substantiated by reports of nausea and headache
If this level of pollution is maintained for 3 min, the buzzer is activated for 1 to 2 seconds and the pictogram remains visible. If this level of pollution is maintained over 15 min, the exposure time will be displayed continuously. **It is advisable to limit its activity.**

1st warning level, equivalent to 110 ppb of H_2S and Mercaptans: flashing red light

WHO *guideline* value. If this level of pollution is maintained for 3 min, the buzzer is activated for 1 to 2 seconds and the pictogram remains visible. If this level of pollution is maintained over 15 min, the exposure time will be displayed continuously. **It is advisable to only engage in quiet activities.**

2nd warning level, equivalent to 200 ppb of H_2S and Mercaptans: flashing purple light;

If this level of pollution is maintained for 3 min, the buzzer is activated for 1 to 2 seconds and the pictogram remains visible. If this level of pollution is maintained over 15 min, the exposure time will be displayed continuously.
It is advisable to rest.

3rd warning level, equivalent to 600 ppb of H_2S and Mercaptans: flashing maroon light

EPA's Integrated Risk Management System published information suggesting children and neonatal animals could be selectively susceptible to neurological effects
If this level of pollution is maintained for 3 min, the buzzer is activated for 1 to 2 seconds and the pictogram remains visible. If this level of pollution is maintained over 15 min, the exposure time will

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be displayed continuously. **It is advisable to stay far away from the sources.**

How does the Cairclip display a reduction of pollution level and exposure time?

If the pollution level falls below the threshold corresponding to a pictogram, it will turn it off but the decrease in exposure time will only start after 5 minutes (in order to compensate for natural variations around the value being measured).

The total exposure for the day can be displayed on a PC running the CairSoft software by connecting the Cairclip via the included USB cable. If you do not have a PC, insert the Red USB plug in the Cairclip USB port for 6 to 10 seconds then remove it and the value of the cumulative exposure from morning 0 h will be displayed for 30 s.

VII SAFETY INSTRUCTIONS

The Cairclip comes packaged in a waterproof bag to avoid exposition to vapors (during transport, for example) that could harm its operation.

In the Air quality Units mode, between 30 and 1000 ppb of H_2S and Mercaptans, the accuracy of the Cairclip is 10 ppb.
In the Forced measurement mode, between 0 and 30 ppb, the accuracy of Cairclip can be strongly influenced by its environment (draft, proximity to skin, breath ...): A quiet area is best to stabilize the measures.
It is prohibited to immerse Cairclip.
In the case of accidental splashing with water, drain and wipe the Cairclip immediately with a clean and dry cloth.
Do not used the CairClip at height upper than 2000 meters.
Use standard batteries recycling method at the end of the 12 month end life.
Battery not exchangeable.
Do not expose Cairclip to very dry air (<5% humidity) or to high concentrations of gases such as:

* combustion gases (exhaust of vehicles, gas stoves, boilers, dryers gas, cigarettes smoke ...)
* Solvents (glue, paint ...) or chlorine ...
* Acidic or basic vapors.
* Steam and water saturated vapor (Breath, sauna, Hammam ...)

VIII INTELLECTUAL PROPERTIES

The Cairpol name, the logo Cairpol, the names of products in its family as well as the slogans and the technology developed by Cairpol are, unless otherwise stated, trademarks and patents. Any reproduction, use and / or modification made without Cairpol prior approval is likely to constitute an infringement.

IX CONTACT

For more information, don't hesitate to ask:

CAIRPOL
Avenue Olivier de SERRES
Centre Commercial Rocade Sud
30100 ALES
FRANCE
Phone : +33 (0)4.66.83 37 56
E-Mail : info@cairpol.com

X WARRANTY CONDITIONS

Cairpol Devices are guaranteed 12 months parts and labor.
Beyond 12 months, the operation of the Cairclip may not be sufficiently accurate and it is advisable to replace it.
Opening of the device by unauthorized personnel will invalidate any warranty.
While following the safety rules and operation described in the present manual, you have noticed what you believe is an abnormal peak, we encourage you in sharing the details of your observations in the contact section of our web site at www.cairpol.com.

XI APPLICATION

► **For general public:** Thanks to its small size, easy to wear and warns in real time the level of pollutants in the aim to adapt activities avoiding health problems
► **For associations, school or city hall** : Thanks to its moderate cost allows to use some to map the air pollution district by district.
Large colored screen option permits persons group information.
► **For industries:** Fixe or mobile with wireless connection and solar panel.

XII ACCESSORIES

► USB cable: for battery recharge (on PC or power supply via adaptor) and data transfer
►USB plug
* green (on desk functioning)
* red (measure mode/Time mode, exposure)
► Adaptor 100V-240V/5V 0.8A-1.0A USB
► Pouch with belt clip
► Recharge filter for 1 year
► Instruction manual

● Optional accessories:

► Solar panel
► Bluetooth for GSM/GPRS

XIII MAIN OPTIONS

Cairtub: autonomy 21days
Cairnet: wireless connexion & battery powered by solar panel
Software: cairsoft, cairmap, cairweb

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XIV DATA SHEET H_2S

Specifications:	Range: 0-1000 ppb
Limit of detection (*)	10 ppb
Repeatability at zero (*)	± 10 ppb
Repeatability at 80% of range (*)	± 4%
Linearity (*)	<5%
Short term Zero drift (*)	< 4 ppb / 24 h
Short term Span drift (*)	< 0,1 % FS / 24 h
Long term Zero drift (*)	< 8 ppb / 1 month
Long term Span drift (*)	< 2 % FS / 1 month
Rise time (T10-90) (*)	< 90 s (180s if large h% variation)
Fall time (T10-90) (*)	< 90 s (180s if large h% variation)
Effect of Interfering species (*)	CH_3SH: 95% other VRSC (OCS, C_2H_6S, $C_2H_6S_2$) : < 100 %
▪ power supply:	5VDC / 200mA (rechargeable by USB via PC or 100V-240V / 5V 0.8A-1.0A with adaptor)
▪ output:	USB (RS 232 or UART on demand)
▪ operating conditions:	-20 °C to +45°C / 10 to 90% R.H. (without condensation), 1013 mbar +/- 200mbar
▪ dimensions:	diameter: 32mm, length: 62mm
▪ weight:	55 g
▪ Protection	IP 42 (according IEC60529)
Maximum exposure	50 ppm
Annual exposure limit (1 hour average)	220 000 ppm

**According to our operating condition during test in laboratory:*
20°C +/-2°C
50% HR + /- 10%
1013 mbar +/- 5%

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